



WinCube Project

Winnipeg, Manitoba Canada

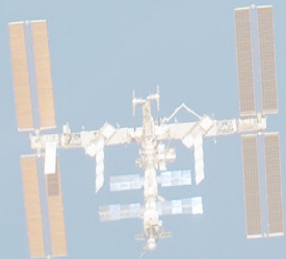
Dr. Stefan Wagener, VE4NSA
Manitoba Satellite Interest Group (MSIG)
ARISS Canada





WinCube Project

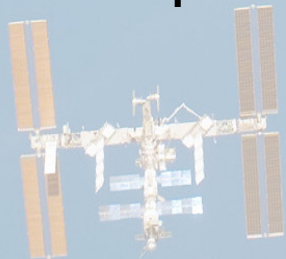
- Manitoba High School Students involved in pico-satellite construction, amateur radio, and high altitude balloon projects
 - Students learn first hand about space mission design, telecommunications, programming, electrical and mechanical engineering and amateur radio





WinCube Project

- WinCube Partnership:
 - Manitoba Satellite Interest Group (MSIG)
 - Manitoba Aerospace
 - AppSpace Solutions
 - MindSet (Manitoba Network for Science and Technology)
 - University of Manitoba (Faculty of Engineering)
 - Bristol Aerospace
 - Maples Collegiate Space Exploration Academy





WinCube Project



WinCube High School Initiative

CubeSat (Pico-Satellite)

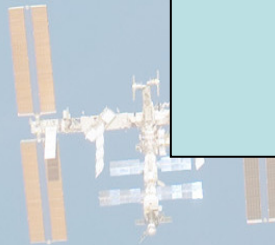
Amateur Radio Certificate Class

Manitoba Space Adventure Camp

B-Cube (High Altitude Balloon)

Satellite Ground Station

ARISS Telebridge Station





CubeSat

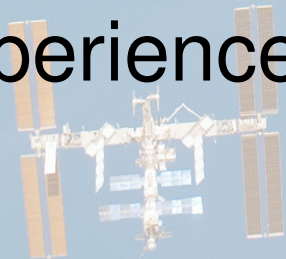
- Project funded through NSERC (Natural Sciences and Engineering Research Council of Canada) and MindSet, the Manitoba Network for Science and Technology
 - Partnership and mentorship with the University of Manitoba - Faculty of Engineering
 - Multi-year project
 - Specs based on CalPoly CubeSat program





CubeSat

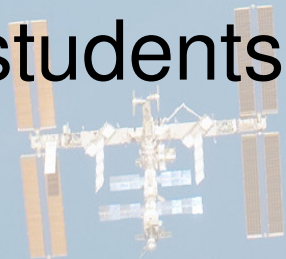
- Key factors for High School Students
 - Mentorship through aerospace industry and university students
 - Gaining experience in payload design and construction through high altitude balloon work (B-Cube Project)
 - Defined educational goals (curriculum)
 - Amateur radio certification and ground station operation experience





CubeSat

- Phase 1
 - Preliminary Design Review (PDR) Report was created by 4th year Engineering Students at the University of Manitoba during the 2006-2007 school year
- Phase 2
 - Construction and testing of individual components in 2007-2008 with assistance by high school students

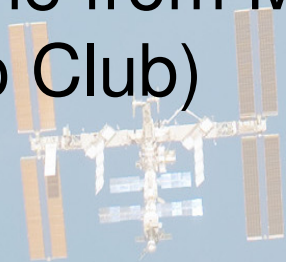


Status: ongoing



Amateur Radio Class

- Initiated in the 2006/2007 school year
 - Involvement by six high schools
 - Amateur radio certificates for six students and three teachers
- Attendance at class and exam is a requirement for CubeSat project participation
- New class in 2007/2008 school year
 - Instructors come from MSIG and WARC (Winnipeg Amateur Radio Club)



Status: ongoing



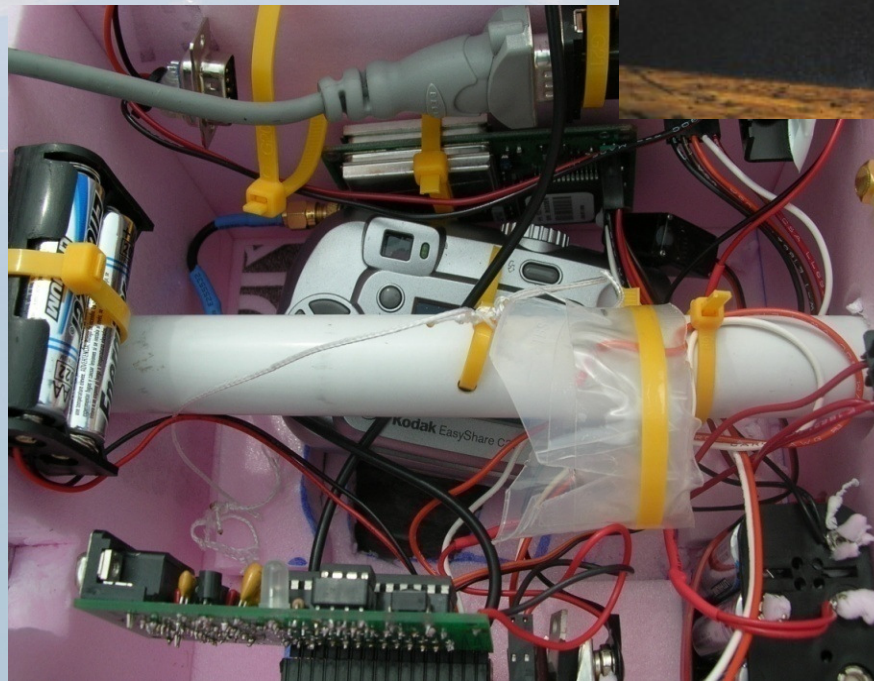
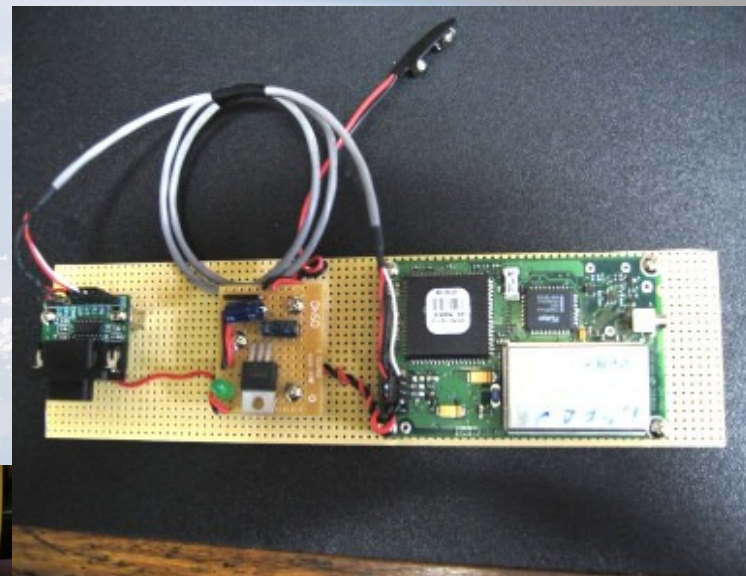
B-Cube

- High Altitude Balloon Project
 - Funding was obtained from the Canadian Space Agency (CAS)
 - **Hands-On learning of “satellite” components**
 - Design and construct a ready-to-be-assembled B-Cube (Balloon payload) kit
 - “Plug and Play” approach is very important for many science teachers
 - Incorporation into the ongoing science curriculum of the school with a certain level of success





B-Cube



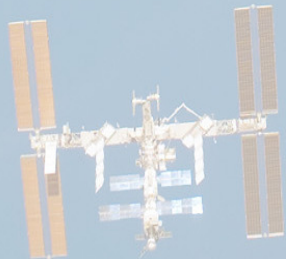
Status: ongoing



Manitoba Space Adventure Camp

- Camp in 2006 and 2007 at the 17th Wing (Canadian Forces School of Aerospace Studies)
 - build and launch model rockets
 - operate satellite navigation devices
 - participate in a research balloon launch
 - work with amateur radio via satellites
 - tours and lectures
 - geocaching and various lab sessions

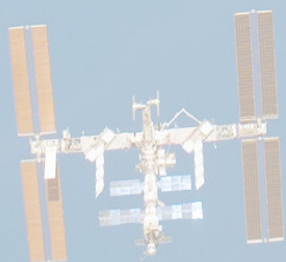
Status: ongoing





ISS Contact - July 12, 2007

- Application submitted by Maples Collegiate in the fall of 2006
 - First notification that a contact might be possible in May, 2007 through ARISS
 - **Final confirmation on July 3rd**
- Contact with ISS Expedition 15 on July 12, 2007





ISS Contact





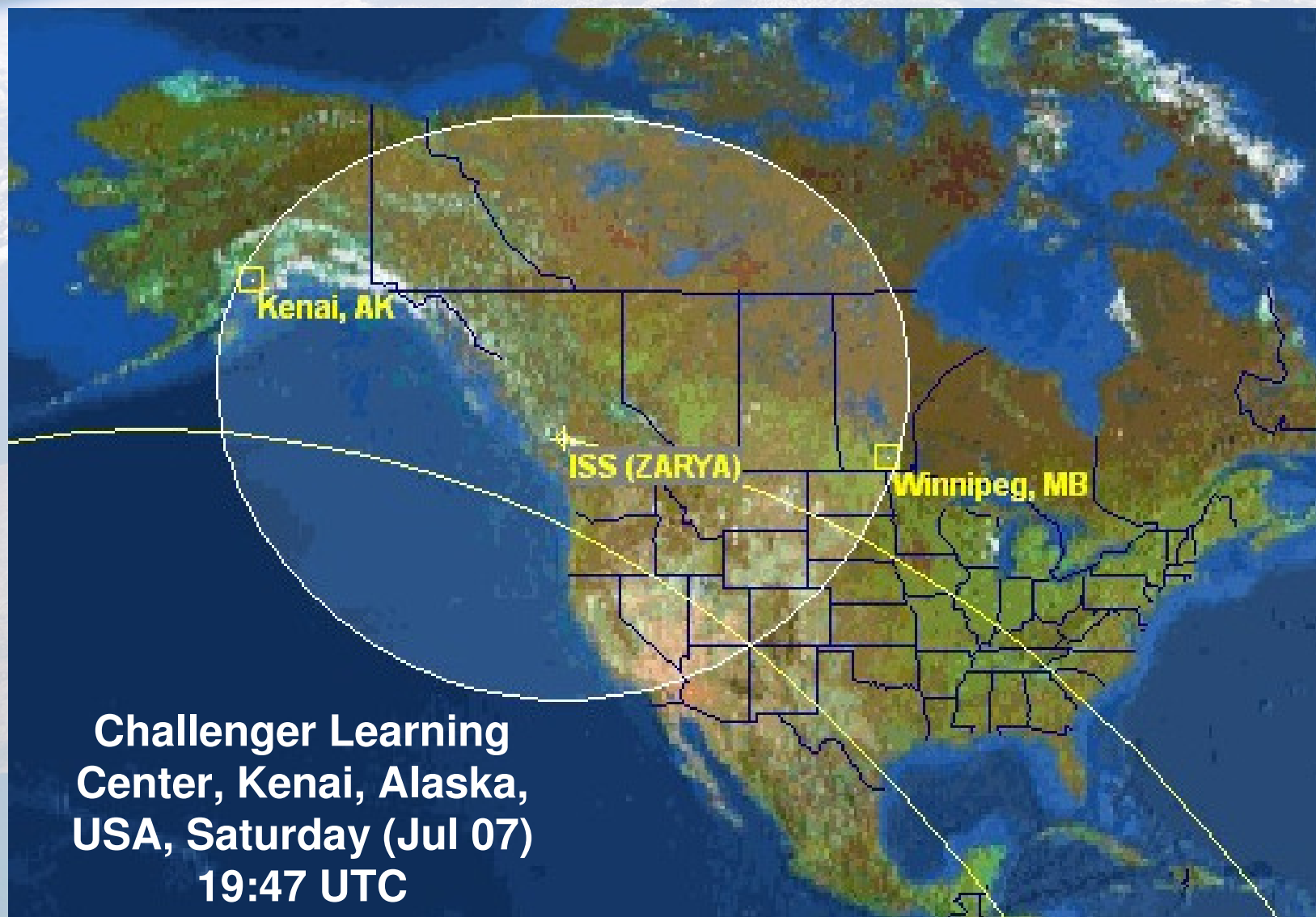
Primary Station

- **Kenwood TS2000;**
- **SSB 2m preamp** controlled via SSB sequencer and TS2000;
- **200+ feet of LMR400;**
- **SatPC32 (ISS)** for frequency and Doppler control of TS2000;
- **Nova for Windows for LVB tracker rotor control;**
- HyGain 2m cross polarized satellite yagi antenna (polarization switching disabled);
- *HyGain 70cm cross polarized satellite yagi antenna (polarization switching disabled) used for additional satellite contacts only (Not used for ISS);*
- **Yaesu G-5500 az/el rotor** with 2 x 200+ feet of rotor control cable (8 conductor, 16 gauge wire);
- Home made quadpod with 8 feet aluminum mast on flat roof;
- **LVB tracker rotor interface;**
- Laptop (WinXP) for radio and rotor control;
- **UPS backup for laptop, rotor and radio.**





Testing Equipment...





ISS Contact





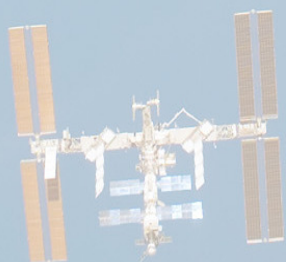
Congratulations!





Contact

- 12, 2007 at 11:51am (local time), 16:51pm (UTC)
- Maximum elevation of the ISS was 70°
- Contact lasted for a little over 9 minutes
- Clay Anderson answered 18 questions





Nothing happens without Partners

- MSIG
- WARC
- WinCube
- ARISS

Alan Thoren, VE4YZ

Steve McFarlane,
VE3TBD

Dieter Schliemann, KX4Y

Jeff Cieszecki, VE4CZK

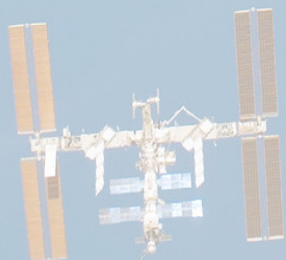
Greg Linton, VA4GL

Albert Sousa, VA4AS

Geoff Bawden, VE4BAW

Fred Venema, VE4FV

Gerry Baker, VE4GTB





What's next...

Maples Collegiate contact will still happen
School contact with Churchill, Manitoba





What's next...

VE4ISS

VA4ISS

Winnipeg, MB

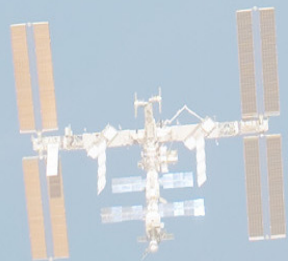
ARRISS Telebridge Station
(Winnipeg, Manitoba)

ISS (ZARYA)



What's next?

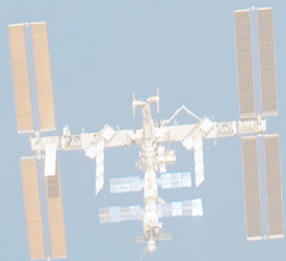
- Finalize plug-and-play B-Cube kit and start production for schools
- Phase II of the CubeSat and fundraising campaign for launch cost
- 2008 Manitoba Space Camp program





Lessons learned

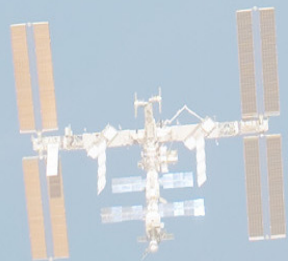
- KISS
- Students get bored... easily
- Funding is critical (\$\$\$)
- Diversify and leverage





Acknowledgements

- Background image: STS-118 image (Aug. 19, 2007) of the ISS, courtesy of NASA
- ARISS International
- CalPoly (CubeSat Program)
- Funding Partners



S118-E-09467



www.msig.ca

Q&A

